



February 23, 2021

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

INFORMATIONAL FILING-NO NOTICE REQUIRED

**Re: California Independent System Operator Corporation
Informational Readiness Certification for Turlock Irrigation District's
Participation in the Energy Imbalance Market
Docket No. ER15-861-000**

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) submits this informational filing in compliance with section 29.2(b)(6) of the CAISO tariff.¹ The CAISO, in consultation with the Turlock Irrigation District (TID), has determined that, following market simulation and an adequate period of parallel operations, the CAISO and TID have met all readiness criteria specified in section 29.2(b)(7). In support of this determination the CAISO hereby submits the sworn CAISO affidavit of Khaled Abdul-Rahman, Vice President of Power System and Market Technology, and the sworn TID affidavit of Manjot Gill, Assistant General Manager – Electrical Engineering and Operations. This filing certifies the readiness of the CAISO and TID to proceed with TID's participation in the CAISO's Energy Imbalance Market (EIM) on March 25, 2021, without exception, consistent with the requirement to do so at least 30 days prior.

I. Background

The EIM provides other balancing authority areas the opportunity to participate in the real-time market for imbalance energy that the CAISO operates in its own balancing authority area. PacifiCorp's balancing authorities were the first two balancing authorities to join the EIM beyond the CAISO balancing authority area. The CAISO's

¹ The Commission has determined that readiness certifications are considered informational filings and will not be noticed for comment. See *Cal. Indep. Sys. Operator Corp.*, 153 FERC ¶ 61,205 at P 86 and n.173 (2015); see also *Cal. Indep. Sys. Operator Corp.*, 155 FERC ¶ 61,283 at P 8 (2016).

EIM tariff provisions went into effect on October 24, 2014, in time for the first trading day of November 1, 2014.² In a March 16, 2015 order,³ the Commission concluded that certain readiness safeguards are necessary prior to activating a prospective EIM entity in production.⁴ Accordingly, the Commission directed the CAISO to include provisions in its tariff to ensure the readiness of any new EIM entity. The Commission further required that the certification of market readiness include a sworn affidavit from an officer of the CAISO and an officer of the prospective EIM entity attesting that both have prepared and made ready the systems and processes for the new EIM entity to commence financially binding participation in the EIM.⁵ Following two compliance filings, the Commission accepted the CAISO's proposed readiness criteria.⁶ These criteria appear in section 29.2(b)(7) of the CAISO Tariff.

II. Readiness Reporting, Determination, and Attestations

The CAISO and TID ran market simulation scenarios from November 3, 2020 to January 26, 2021. Parallel (*i.e.*, financially nonbinding) operations, which began on January 27, 2021, will run through at least February 23, 2021 and, in any event, will continue to be supported and available to TID until March 25, 2021. During market simulation and parallel operations the CAISO and TID have engaged in daily discussions to track progress and confirm the status of each readiness criterion, and the CAISO has regularly reported on readiness status in market forum discussions and publicly posted a table or "dashboard," showing progress towards meeting the readiness criteria.⁷ The process of updating the readiness dashboard through this joint effort involved representatives from both organizations, including the senior officers who have attested that the parties' processes and systems are ready for TID's participation in the EIM.

The market simulation confirmed system functionality and connectivity by identifying issues and software variances in advance of implementation that have since been resolved. In addition, market simulation permitted the CAISO and TID to validate

² See *Cal. Indep. Sys. Operator Corp.*, 147 FERC ¶ 61,231 (2014) (June 19 Order) (conditionally accepting tariff revisions to implement Energy Imbalance Market); *Cal. Indep. Sys. Operator Corp.*, 149 FERC ¶ 61,058 (2014) (order denying requests for rehearing, granting in part and denying in part requests for clarification, and conditionally accepting tariff revisions on compliance with regard to order listed above); Commission Letter Order, 149 FERC ¶ 61,005 (Oct. 2, 2014) (order granting CAISO request to extend effective date of Energy Imbalance Market tariff revisions from September 23, 2014, to October 24, 2014, for trading day November 1, 2014).

³ *Cal. Indep. Sys. Operator Corp.*, 150 FERC ¶ 61,191 (2015) (March 16 Order).

⁴ *Id.* at P 30.

⁵ *Id.* n.85.

⁶ *Cal. Indep. Sys. Operator Corp.*, 153 FERC ¶ 61,205 (2015).

⁷ More information on the status of these other reports consistent with CAISO tariff section 29.2(b)(8) is available on the CAISO website under the EIM Entities TID entry for 2021 at:

<http://www.caiso.com/informed/Pages/ReleasePlanning/Default.aspx>.

performance of the systems and processes under a variety of structured scenarios. The market simulation dashboard dated January 29, 2021 demonstrated that the CAISO and TID were ready to enter parallel operations. Having achieved the benefits from market simulation, the CAISO and TID transitioned to parallel operations on January 27, 2021.

The parallel operations phase is designed to test performance of the systems and processes in a financially non-binding environment using historical data and information from production systems to the maximum extent possible. The CAISO and TID have engaged in parallel operations to examine capabilities at different times and conditions (morning ramp, evening ramp, low load and peak load). Doing so has permitted TID to understand the interaction between resource plans, base schedules, outage management, manual dispatch, and the CAISO full network model. This period has also allowed the CAISO and TID to identify and resolve software issues. The dashboard dated February 12, 2021 showed the progress during initial parallel operations as additional readiness criteria were met. The final dashboard, dated February 22, 2021, is included as Attachment A. The dashboard sets forth each of the readiness criteria in the tariff, the metrics by which the CAISO measures satisfaction of the criteria, and the actions or status that demonstrate TID's compliance with criteria. The dashboard shows that all readiness criteria have been satisfied or will be satisfied by March 25, 2021.

Section 29(b)(6) requires that a senior officer of the CAISO and a prospective EIM entity attest (1) that the processes and systems of the prospective EIM Entity have satisfied or will have satisfied the readiness criteria set forth in section 29.2(b)(7) as of the Implementation Date; (2) to any known issues requiring resolution prior to the Implementation Date in accordance with section 29.2(b)(8); (3) to any exceptions from the established thresholds specified in the Business Practice Manuals, and that despite such exceptions the criteria were met or will be met as specified in 29.2(b)(7); and (4) that the Implementation Date is conditional on the resolution of the known issues identified in the certificates and any unforeseen issues that undermine the satisfaction of the readiness criteria. Attachments B and C, respectively, contain the sworn CAISO affidavit of Khaled Abdul-Rahman, Vice President of Power System and Market Technology and the sworn TID affidavit of Manjot Gill, Assistant General Manager – Electrical Engineering and Operations in satisfaction of this requirement.

The affidavits are based upon the engagement by these senior officers in assessing the readiness criteria as reported in the dashboard, including supporting documentation. The CAISO believes that the market simulation and parallel operations to date demonstrate that TID is prepared to enter financially binding production EIM operations on March 25, 2021. As discussed in the Market Quality Report included as Attachment D, any issues identified in the parallel operations have been resolved or will be resolved. Neither the CAISO nor TID has identified any exception to any of the readiness criteria.

III. Market Quality Report on Parallel Operations

Parallel operations allowed the CAISO and TID to identify and resolve numerous input, process, and software issues prior to the commencement of financially binding operations.⁸ The CAISO and TID worked diligently during parallel operations to identify the cause of the infeasibilities that arose. The attached Market Quality Report demonstrates that the majority of the power balance infeasibilities identified during the period of parallel operations associated with the readiness determination were caused by input data issues, some of which are unique to the parallel operations environment and software issues, all of which have been or will be resolved by the implementation date.

The CAISO validated both prices and schedules based on the data input to the market systems throughout the first 14 days of parallel operations. This validation demonstrates that the market solution produced is as expected and consistent with the market rules as designed based on the input data. The analysis conducted for the report accounts for the fact that input data may be influenced by limitations inherent in the parallel operations environment and these limitations may affect the quality of the solution. When factors affecting the input data are controlled for, the numerical quality of the market solution is good and indicates that the systems and processes of TID are ready to operate in production.

V. Attachments

Besides this transmittal letter, this filing includes these attachments:

- Attachment A: Readiness Dashboard Report
- Attachment B: Affidavit of Khaled Abdul-Rahman
- Attachment C: Affidavit of Manjot Gill
- Attachment D: Parallel Operations Market Quality Report

⁸ The market quality report on parallel operations dated February 22, 2021 explains how each of these issues impacted the market results and how they were resolved by the CAISO and TID.

VI. Conclusion

The CAISO respectfully requests that the Commission accept this certification as consistent with section 29.2(b)(6) of the CAISO tariff. The CAISO or TID will notify the Commission in the event of any subsequent determination that the implementation of TID into the EIM on March 25, 2021 should be delayed, the reason for the delay, the new implementation date if it can be determined, and whether a portion or all of this certification needs to be reissued.

Respectfully submitted,

By: /s/ John C. Anders

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Attachment A – Readiness Dashboard Report

Informational Readiness Certification for Turlock Irrigation District's

Participation in the Energy Imbalance Market

California Independent Systems Operator Corporation

February 23, 2021

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
1	Prospective EIM Entity Full Network Model Integration	Generation, Interchange and Load comparison	Load, EIM Internal Intertie and EIM External Interties, and Generating Unit definition in the Full Network Model is consistent with the Load, EIM Internal Intertie and EIM External Interties, and Generating Unit definition in the exported prospective EIM Entity network model file that it delivered to the CAISO.	Data matches within 10%, measured in MW capacity to start parallel operation, and within 5% before full activation. Any Discrepancies are accounted for in terms of imbalance adjustment	CAISO	Complete	CAISO provided reports indicating that the Generating Unit, Intertie and Load definition in the CAISO's Full Network Model is consistent with the network modeling information in TID network model.	Tariff section 29.2(b)(7)(A)(i)
2	Prospective EIM Entity Full Network Model Integration	Comparison of SCADA measurement	SCADA measurements used in prospective EIM Entity EMS model match the measurements observed by the CAISO through the CAISO EMS model	Critical and used SCADA measurements match 90% to start parallel operation and 95% before full activation, measured in MW, outside of any exception in EMS model	CAISO	Complete	CAISO provided reports indicating critical and used SCADA TID is publishing match to the values seen by the CAISO.	Tariff section 29.2(b)(7)(A)(ii)
3	Prospective EIM Entity Full Network Model Integration	State Estimator solution	CAISO state estimator solution is equivalent or superior to the prospective EIM Entity state estimator solution for its Balancing Authority Area.	State Estimator solutions converge >90% of the time in two days before parallel operation and three days before full activation. Solution differences within 10% before parallel operation and 5% before full activation measured in MW or justified due to different external BAA modeling	CAISO	Complete	CAISO provided reports CAISO State estimator has been solving on continuous basis on the CAISO EMS PROD system.	Tariff section 29.2(b)(7)(A)(ii i)
4	Prospective EIM Entity Full Network Model Integration	Non-Conforming Load, Behind-the-Meter Generation, Pseudo Ties, and Dynamic Schedules	Physical representation of the prospective EIM Entity's network matches the Base Market Model that accounts for non-conforming load, behind-the-meter generation, pseudo-ties, and dynamic schedules, and third party transmission service provider and path operator information that supports EIM Transfers and Real-Time Dispatch in the Energy Imbalance Market, as applicable	Prospective EIM Entity major non-conforming loads > 5% of prospective EIM Entity total actual load in MW are modeled separately from conforming load in market model	CAISO	Complete	TID confirmed they have no non-conforming loads.	Tariff section 29.2(b)(7)(A)(i v)
5	Agreements	Execution of Necessary Agreements	The prospective EIM Entity has executed all necessary agreements.	The prospective EIM Entity will execute all agreements, as outlined in Section 5 of the EIM BPM within the required timelines outlined in Section 5.	JOINT	Complete	All agreements are complete with executed agreements as evidence.	Tariff section 29.2(b)(7)(K)(i)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
6	Operations Training	Completion of mandatory training courses	Prospective EIM Entity operators who will have responsibility for EIM operations, transactions and settlements, will complete CAISO training modules.	Prospective EIM Entity operators will Complete training and close-of-training assessment in the appropriate timeframes as outlined in “100 series”– an introduction to Energy Imbalance Market training “200 series”– the specific hourly and daily tasks and duties for normal operation training module; and “300 series”– the assessment of market results and response to contingencies and abnormal situations training module.	TID	Complete	TID provided evidence that all necessary training has been completed.	Tariff section 29.2(b)(7)(B)
7	Forecasting Capability	Load forecast capability	Definition of EIM demand forecast boundaries based on the conforming and non-conforming load characteristics, as applicable. <ul style="list-style-type: none"> Accuracy of the CAISO forecast of EIM demand based on historical actual load data for the defined EIM demand forecast boundaries. Identification of weather station(s) locations used in forecasting, if applicable. 	All Plant Information (PI) tags and historical data for defined load area(s), and non-conforming load, if applicable, compared with load forecasts provided from CAISO (if CAISO load forecast used).	CAISO	Complete	The ISO Short-Term Forecasting team provided screen shots from Forecast Monitoring showing accurate measurements to satisfy this criterion	Tariff sections 29.2(b)(7)(C)(i)-(iii)
8	Forecasting Capability	Variable Energy Resource (VER) forecast capability	Identification of the source of VER forecasts. (If a participating wind or solar unit requires a CAISO forecast, then BPM and Tariff requirements apply.)	Forecasting entity must demonstrate delivery of Unit MW forecast at 5 min intervals for at least three hours ahead. Forecasting entity must also provide base schedule by T-75, T-55 and T-40. EIM Entity provides to CAISO real-time MW production PI tags.	CAISO	Complete	TID provided evidence to meet this criteria.	Tariff section 29.2(b)(7)(C)(iv)
9	Forecasting Capability	Flexible capacity requirements	CAISO has established flexible capacity requirements for the prospective EIM Entity Balancing Authority Area and the combined EIM Area including the prospective EIM Entity	The CAISO has received and stored all historical data from the prospective EIM Entity necessary and sufficient for the CAISO to perform the flexible ramp requirement.	CAISO	Complete	CAISO Short Term Forecasting team provided evidence that the ISO is getting stable estimates of the data that feeds the calculation for the Flexible Ramp Product Uncertainty.	Tariff section 29.2(b)(7)(K)(iv)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
10	Balanced Schedules	Base schedule balancing capability	The prospective EIM Entity Scheduling Coordinator demonstrates its ability to balance EIM demand and EIM supply for the prospective EIM Entity's Balancing Authority Area	90% or greater of base schedules balance tests during monitored hours are within 10% average imbalance of load forecast over one day period before parallel operation, and 5% average over five full days before full activation. The CAISO will provide examples of MW thresholds for each prospective EIM Entity to indicate a reasonable threshold as it applies to a given EIM Entity and indicate the potential implications of a swing from 5% over to 5% under forecast in one hour to the next.	TID	Complete	CAISO reviewed the evidence provided; based on the attached test results, TID has met readiness criteria for	Tariff section 29.2(b)(7)(D)(i)
11	Balanced Schedules	Flexible ramping sufficiency test capability	The prospective EIM Entity \ Scheduling Coordinator demonstrates its ability to pass the flexible ramping sufficiency test.	Passes 90% of the time or greater over monitored hours of one day before parallel operation and five non-consecutive days before full activation.	TID	Complete	CAISO provided reports indicating that TID has met the flexible ramping sufficiency test (both Up and Down).	Tariff section 29.2(b)(7)(D)(ii)
12	Balanced Schedules	Capacity test capability	The prospective EIM Entity Scheduling Coordinator demonstrates its ability to pass capacity test	Passes 90% of the time or greater over monitored hours of one day before parallel operation and five non-consecutive days before full activation. The CAISO will explain the implications of any potential issues with the reliability of an EIM Entity to meet its capacity requirements.	CAISO	Complete	CAISO email confirming that they had reviewed the evidence provided; TID has met the capacity test capability	Tariff section 29.2(b)(7)(D)(ii)
13	Operating Procedures	CAISO operating procedures (relevant to EIM operations)	The prospective EIM Entity signs CAISO non-disclosure agreement and receives appropriate CAISO "public" and "restricted" operating procedures	Operating procedures NDA signed by the prospective EIM Entity. The prospective EIM Entity receives CAISO operating procedures four months prior to the parallel operations date.	JOINT	Complete	Operating procedures have been shared with TID Participants	Tariff section 29.2(b)(7)(K)(i)
14	Operating Procedures	Prospective EIM Entity operating procedures	The prospective EIM Entity operating procedures are defined, updated, and tested for the EIM Entity Scheduling Coordinator	The prospective EIM Entity operating procedures are updated tested and implemented prior to parallel operations date.	TID	Complete	TID provided email confirming that their operating procedures are complete	Tariff section 29.2(b)(7)(K)(ii)
15	System Readiness & Integration	Functional Testing	The prospective EIM Entity and the CAISO will test the functional and system elements in accordance with functional and system testing documentation posted on the CAISO website	All tasks identified in the functional and system testing documentation are complete and will not have any issues deemed significant. Any exceptions will be explained or have an interim solution that is functionally equivalent.	TID	Complete	TID provided email evidence that functional and system testing is complete.	Tariff section 29.2(b)(7)(E)(i)
16	System Readiness & Integration	System Integration	The prospective EIM Entity and CAISO will test system integration testing in accordance with the system integration testing documentation posted on the CAISO website	All tasks identified in the system integration testing documentation are complete and will not have any issues deemed significant. Any exceptions will be explained or have an interim solution that is functionally equivalent.	TID	Complete	TID provided email evidence that system integration testing is complete.	Tariff section 29.2(b)(7)(E)(ii)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
17	System Readiness & Integration	The prospective EIM Entity system access complete	All prospective EIM Entity employees who require system access to perform EIM-related job functions identified and have necessary certificates.	All prospective EIM Employees performing job functions for EIM market are identified. All CAISO issued certificates are requested within the appropriate timeframes. All identified employees provided the necessary EIM system access certificates.	TID	Complete	CAISO provided evidence that all necessary TID staff have required access for Parallel Operations. TID confirmed the access is in place and plan is in place for production.	Tariff section 29.2(b)(7)(E)(ii i)
18	System Readiness & Integration	ISO - prospective EIM Entity interfaces	Data interfaces between prospective EIM Entity's systems and CAISO systems are tested	ISO and prospective EIM Entity identify significant data interface issues. EIM Entity and CAISO executives to approve exceptions.	JOINT	Complete	TID provided the testing timeline summary document reflecting that all interface testing completed	Tariff section 29.2(b)(7)(E)(i)
19	Market Simulation	Day in the life simulation	The prospective EIM Entity operators are able to meet the market timelines	The prospective EIM Entity grid operations staff complete end-to-end daily market workflow with no critical defects.	JOINT	Complete	TID provided the testing timeline summary document reflecting that Day-In-The-Life testing was complete and successful.	Tariff section 29.2(b)(7)(I)(ii)
20	Market Simulation	Structured scenarios simulation	The prospective EIM Entity operators execute and pass all structured scenarios provided by CAISO	All significant issues resolved or have an interim solution that is functionally equivalent.	JOINT	Complete	TID and the ISO have successfully executed the operational components of all Structured Market Simulation Scenarios successfully. Evidence uploaded to the EIM Accellion site.	Tariff section 29.2(b)(7)(I)(iii)
21	Market Simulation	Unstructured scenarios simulation	The prospective EIM Entity operators execute and pass all unstructured scenarios provided by prospective EIM Entity	All significant issues resolved or have an interim solution that is functionally equivalent.	JOINT	Complete	TID provided evidence to meet this criteria.	Tariff section 29.2(b)(7)(I)(iv)
22	Market Simulation	Market results reports	Market results are appropriate based on inputs	The prospective EIM Entity and CAISO executive project sponsors approve the market results reports during market simulation	TID	Complete	CAISO provided an email summarizing the market results during market simulation.	Tariff section 29.2(b)(7)(I)(v)
23a	Market Simulation	Market quality review	Prices are validated based on input data	Market simulation prices and MWs schedules/dispatches are validated by CAISO market quality team for entry into parallel operations	CAISO	Complete	CAISO provided an email indicating Market simulation prices and MWs schedules/dispatches are validated by CAISO market quality team for entry into parallel operations	Tariff section 29.2(b)(7)(I)(vi)
23b	Parallel Operations	Market quality review	Prices are validated based on input data	Parallel operations prices and MWs schedules/dispatches are validated by the CAISO market quality team	CAISO	Complete	CASIO provided evidence that Parallel operations prices and MWs schedules/dispatches are validated by the CAISO market quality team.	Tariff section 29.2(b)(7)(I)(vi)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
24	Market Simulation	The prospective EIM Entity Identification	Validation of SCID's and Resource ID's	The CAISO has established and the prospective EIM Entity has tested all necessary SCIDs and Resource IDs established for the prospective EIM Entity's Balancing Authority Area	JOINT	Complete	TID provided the final updated schedule 1 form and an email confirming this criteria has been met.	Tariff section 29.2(b)(7)(I)(i)
25	Settlements	ISO Settlement Statements and Invoices published to the prospective EIM Entity and EIM Participating Resources	The CAISO Settlement statements and invoices match the operational data published to stakeholders or fed into settlement system and the resulting calculations correspond to the formulas defined in ISO's tariff and BPMs	Monthly settlement statement and invoice with corresponding daily statements produced during market simulation and parallel operations are verifiably accurate against available data.	JOINT	Complete	TID provided evidence that they have completed validation of the settlement statements and invoices. CAISO Settlement lead confirmed.	Tariff section 29.2(b)(7)(F)(i)
26	Settlements	The prospective EIM Entity settlement statements and invoices reflect accurate allocations to the prospective EIM Entity customers prior to financially binding operations.	Verification that settlement statements and invoices accurately reflects system and market data	The prospective EIM Entity settlement statements and invoices that allocate charges and credits to its customers accurately reflect system and market data during parallel operations.	JOINT	Complete	TID provided an email stating that TID doesn't have third party customers, therefore no allocation of charges and credits is performed or applicable to TID.	Tariff section 29.2(b)(7)(F)(ii)
27	Monitoring	Data monitoring	Sufficient and adequate data is available to the CAISO and the Department of Market Monitoring	All required market monitoring data is available during testing and during post go-live for the key metrics (any exceptions will be addressed). CAISO will provide a market report that will provide publicly available information to all market participants.	CAISO	Complete	CAISO Market Validation and Analysis team and DMM provided confirmation they have sufficient data available.	Tariff section 29.2(b)(7)(K)(v)
28	Parallel Operations Plan	Deployment plan	Parallel operations run consistently and in accordance with the timeframe set forth in the prospective EIM Entity specific parallel operation plan	Parallel operations runs consistently within normal production CAISO Market disruption tolerances.	CAISO	Complete	CAISO provided an email with supporting reports stating the CAISO has verified that the Parallel Operations ran consistently within normal CAISO disruption tolerances.	Tariff section 29.2(b)(7)(J)
29	Outage Management System	Transmission and generation outage submittal and retrieval	The prospective EIM Entity will verify its ability to submit and retrieve outage information with the CAISO	The prospective EIM Entity validate their ability to submit and retrieve transmission out-of-service outages, generation Pmax derates, generation Pmin rerates, and generation out-of-service outage tickets within the required timelines.	JOINT	Complete	TID submitted outages in the Map Stage environment. The CAISO confirmed that these were received and processed in the CAISO systems.	Tariff section 29.2(b)(7)(G)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
30	Communications between the CAISO and the prospective EIM Entity	Voice and/or electronic messaging	Implemented process and procedures used for voice and/or electronic messaging	The process and procedures are incorporated into the prospective EIM Entities business processes before the start of market simulation.	TID	Complete	TID provided email evidence that these processes are in place.	Tariff section 29.2(b)(7)(H)(i)
31	Communications between the CAISO and the prospective EIM Entity	Communication tools	Staff are trained on communication procedures and tools	The prospective EIM Entity operations staff who will have responsibility for EIM operations, transactions and settlements are trained on the relevant operating procedures and tools used for EIM related communications before the start of parallel operations	TID	Complete	TID provided email evidence that their staff has been trained on the communication procedures and tools.	Tariff section 29.2(b)(7)(H)(ii)
32	Communications between the CAISO and the prospective EIM Entity	3 rd party transmission service provider	The third party transmission service provider information that supports EIM Transfers and Real-Time Dispatch included in the Full Network Model is available during parallel operations	The CAISO provides third party transmission service provider and path operator information to the prospective EIM Entity through parallel operations	TID	Complete	TID provided an email confirming that TID does not have any 3rd party transmission customers.	Tariff section 29.2(b)(7)(H)(ii i)
33	EIM Available Balancing Capacity	Identification of EIM Available Balancing Capacity	Participating resources and non-participating resources for EIM Available Balancing Capacity.	The prospective EIM Entity has identified EIM participating resources and non-participating resources that it intends to designate in the EIM Resource Plan as EIM Available Balancing Capacity	TID	Complete	TID provided an email confirming their systems are capable of designating ABC capacity on the participating resources.	Tariff section 29.2(b)(7)(K)(ii i)

Attachment B – Affidavit of Khaled Abdul-Rahman

Informational Readiness Certification for Turlock Irrigation District's

Participation in the Energy Imbalance Market

California Independent Systems Operator Corporation

February 23, 2021

Affidavit of Khaled Abdul-Rahman Certifying Readiness of
Turlock Irrigation District (TID) Implementation in the Energy Imbalance Market

I, Khaled Abdul-Rahman, Vice President of Power Systems and Market Technology for the California Independent System Operator Corporation (CAISO), hereby certify as follows:

1. As the Vice President of Power Systems and Market Technology, I am responsible for the systems and processes that support and enable the Energy Imbalance Market and, as such, I have responsibility for the implementation of TID into that market.
2. I have reviewed the readiness dashboard and find that it is accurate and complete. All readiness criteria set forth in the CAISO's tariff and business practice manual have been satisfied or are expected to be satisfied as of TID's March 25, 2021 implementation date.
3. Based on the readiness dashboard and other materials and my own review of relevant information and direct involvement with the readiness efforts, including testing, market simulation, training and parallel operations, and barring unforeseen developments, the systems and processes of the CAISO and TID will be ready for implementation of TID into the Energy Imbalance Market on March 25, 2021.
4. I will ensure that the CAISO maintains resource commitments necessary to sustain readiness through March 25, 2021 and address any unexpected conditions that may arise before March 25, 2021 that could undermine grid operation or market operation within the existing EIM Area. I will continue to monitor progress and resolve any unexpected conditions that may arise.
5. Actual implementation of TID on March 25, 2021 is conditioned upon the lack of any unexpected and unresolved issues that could undermine grid operation or market operation within the existing EIM Area. I will update this certification in the event any unexpected issues are not resolved as of March 25, 2021.

I hereby declare under penalty of perjury that the foregoing statements are true and correct to the best of my knowledge, information, and belief:



Khaled Abdul-Rahman, Vice President, Power Systems and
Market Technology

February 23, 2021

Attachment C – Affidavit of Manjot Gill

Informational Readiness Certification for Turlock Irrigation District's

Participation in the Energy Imbalance Market

California Independent Systems Operator Corporation

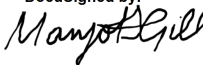
February 23, 2021

Affidavit of Manjot Gill certifying readiness of the
Turlock Irrigation District (TID) Implementation
in the Energy Imbalance Market

I, Manjot Gill, Assistant General Manager – Electrical Engineering and Operations of TID, hereby certify as follows:

1. As the Assistant General Manager – Electrical Engineering and Operations, I am ultimately responsible to the TID for ensuring that all the systems and processes that support and enable the TID Balancing Authority Area to participate in EIM are established and ready for EIM operations. As such, I have overall responsibility for the implementation of TID's entry into that market.
2. I have reviewed the readiness dashboard and find that it is accurate and complete. All applicable readiness criteria set forth in the California Independent System Operator's ("CAISO") tariff and business practice manual for the EIM have been satisfied or are expected to be satisfied as of TID's March 25, 2021, implementation date.
3. Based on the readiness dashboard and other materials prepared for me or for those that report directly to me and my own review of relevant information and direct involvement with readiness efforts, including testing, market simulation, training and parallel operations, and barring unforeseen developments, the systems and processes of CAISO and TID will be ready to implement TID's participation in the EIM on March 25, 2021.
4. I will ensure that TID maintains resource commitments necessary to sustain readiness through March 25, 2021 and address any unexpected conditions that may arise before March 25, 2021 that could undermine grid operation or market operation within the existing EIM Area. I will continue to monitor progress and resolve any unexpected conditions that may arise.
5. Actual implementation of TID's entry on March 25, 2021 is conditioned upon the lack of any unexpected and unresolved issues that could undermine grid operation or market operation within the existing EIM Area. I will update this certification in the event any unexpected issues are not resolved as of March 25, 2021.

I hereby declare under penalty of perjury that the foregoing statements are true and correct to the best of my knowledge, information, and belief.

DocuSigned by:

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Manjot Gill

Assistant General Manager – Electrical
Engineering and Operations

February 22, 2021

Attachment D – Parallel Operations Market Quality Report

Informational Readiness Certification for Turlock Irrigation District's

Participation in the Energy Imbalance Market

California Independent Systems Operator Corporation

February 23, 2021



California ISO

Market Validation of Parallel Operations For Turlock Irrigation District (TID) EIM Entity

February 22, 2021

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Executive Summary

Parallel operations activities of the Energy Imbalance Market (EIM) started on January 27, 2021. This effort provides an opportunity to assess the readiness of the Turlock Irrigation District (TID), the prospective Energy Imbalance Market (EIM) Entity, to participate in the EIM. One of the readiness criteria require the ISO to provide a market performance report for the period of parallel operations carried out for the integration of TIC Balancing Authority Area (BAA) into the real-time EIM. This report fulfills that requirement and summarizes the main findings of market validation carried out by the ISO with an emphasis on the EIM results for the TID (BAA).

The ISO validated both prices and schedules as part of the overall market performance based on input data that fed to the market systems parallel operations from January 27 through February 11. This validation demonstrates that the market solution produced is as expected and consistent with the market rules as designed, recognizing that the input data may be influenced by limitations inherent to the parallel operating environment and these limitations may affect the quality of the solution. When factors affecting the input data are controlled for, the quality of the market solutions are as expected and indicate that the systems and processes of TID are capable of operating in production.

Background and Scope

The intent of parallel operations is to run the market to simulate as close as practically possible actual operating conditions of the system, and to provide TID with an opportunity to go over specific day-to-day processes and activities required for the operation of the EIM. This set-up provides TID and the ISO with an opportunity to test their systems and procedures in advance of financially binding market operations.

Although closely resembling actual operations, parallel operations have some limitations to consider when evaluating market results, including the following:

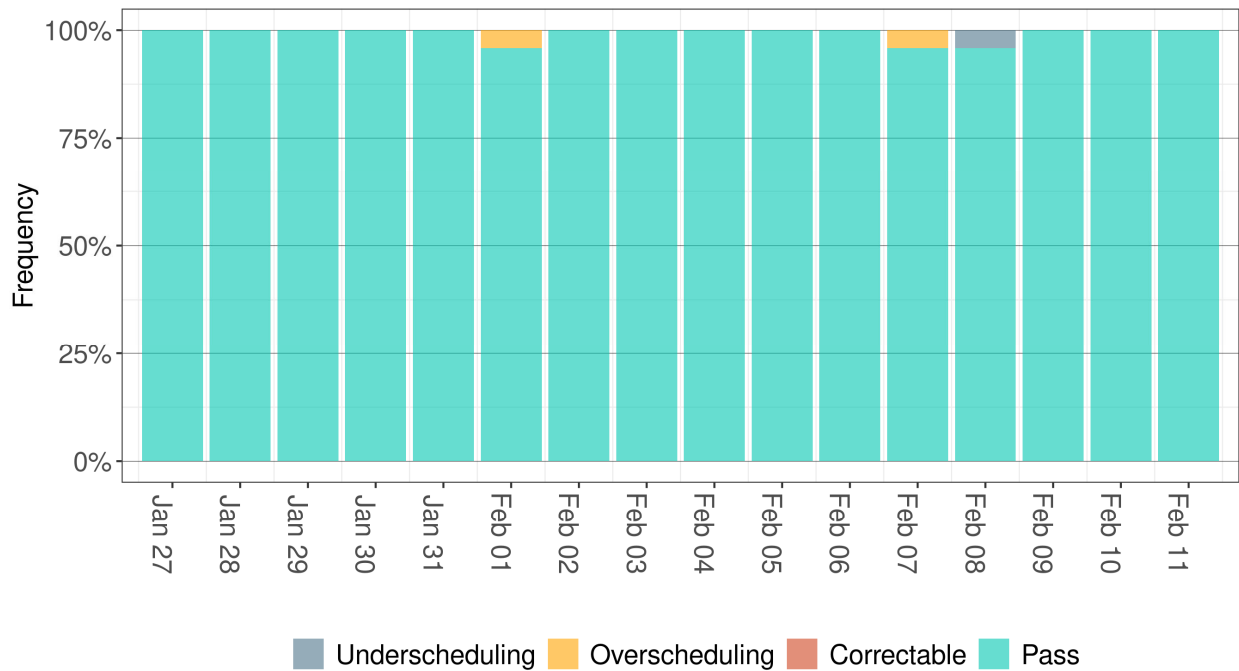
- i) The real-time market requires a set of data inputs to run. In actual real-time market operations, many of these inputs are dynamic, dependent on the participants' resources actual performance, and following instructions. For example, in an actual operating environment, telemetry received from resources gives the information to the ISO system of the operating status of the units, which are changing dynamically and interact with the market systems as the conditions change. During parallel operations, these iterative and interactive data processes are limited because the resources of the prospective EIM entity are not yet required to follow their five-minute dispatch instruction. Similarly, if telemetry from actual production is used, there may be a potential for mismatches between what the actual system is running with versus what the market is projecting due to units potentially not following the market instructions. Therefore, the information regarding the resource's performance feedback to the market systems may or may not be related to the dispatch instruction issues through the parallel operations environment. For the first fourteen days of parallel operations, the TID resources were not following the ISO dispatch instructions, however, the market applications were operated in two configurations. The first configuration used the resource actual telemetry as the input but the resources were not following the market instructions. The second configuration was an echo back system, which fed back the resource dispatch operating target as its telemetry thereby creating a scenario of a perfect response by resources for every dispatch instruction. The first configuration, using actual telemetry, was used in eight of the 16 days, and the other 8 days used the echo back system for all or part of the day.
- ii) In actual operations, intertie resources require a closed loop for the market system to fully reflect the system and market conditions and intertie schedules eventually need to be tagged in order to reflect the system data flows. For parallel operations, it is not possible to replicate fully the actual tagging process, which may pose an additional challenge based on the data that is fed into the market system.
- iii) During parallel operations, the market participant is still defining its resources' data, including characteristics and bids, which consist of three-part bids used for generation resources that require careful consideration of start-up, minimum load and energy bid costs. During this period, the participant is also learning the impacts of the resources constraints on the actual operations of the market.

- iv) During the period of parallel operations, the prospective EIM entities bids and base schedules are merged with the bids and base schedules from the current production systems to simulate the actual production environment. The process of combining information from two systems needs some time to synchronize the data flow across various applications.

These factors, among others, have an effect on the market results and the quality of the solution. Therefore, conclusions on the quality of the market results must consider the input data and the inherent set-up for parallel operations to avoid misleading conclusions about the actual functionality and robustness of the market. The Market Trends section provides metrics that capture TID's market performance during parallel operations; also, it includes various system issues that were identified during parallel operations and that affected market performance. The Market Validation items section provide a summary of issues identified during parallel operations.

Market Trends

Figure 1 shows the TID BAA's performance for the balancing test as required under section 29.34(k) of the ISO tariff. The balancing test provides a reference of how well balanced (energy supply defined by the hourly base schedules meets the demand defined by the forecast respectively) the EIM entity BAA is going to come into the real-time energy imbalance market. Having a large percentage of positive imbalance means the real-time market will be the last resort to balance the area incrementally. The incremental balancing of supply will come from the bid-in capacity made available in the market in addition to the base schedule or EIM transfers between the participating EIM entities' BAAs. During the first sixteen days of parallel operations, TID passed the balancing test for more than 99 percent of hours. TID has failed the balancing test for a minimal number of hours and used this experience in parallel operations as a learning opportunity to improve its processes and procedures for balancing tests.

Figure 1: Daily frequency of power balancing test results


A second test carried out before running the real-time market is the bid range capacity test. Figure 2 and Figure 3 shows the TID BAA’s performance for the bid-range capacity test up and down, respectively. TID passed the up capacity test in 100 percent of the hours and pass the down capacity test in 99.9 percentage of hours between January 27 and February 11. All EIM market participants use Scheduling Infrastructure and Business Rules (SIBR) application to submit bids to the ISO market. After the deadline to submit bids for each trading hour, an automated process transfers this bid to various applications for downstream market processes. On February 3, 2021, hour ending 12, in the ISO parallel operations environment, this automated process failed to transfer bids to the application that performs the capacity test, resulting in a capacity down test failure for TID. In Figure 3, this bid-range capacity test failure is represented as a correctable event. There were two other fifteen-minute intervals during the 16 day period in which the TID BAA did not have sufficient downward bid range capacity to meet the imbalance requirement that resulted in downward bid range capacity test failure.

Figure 2: Daily frequency of bid range up capacity test results

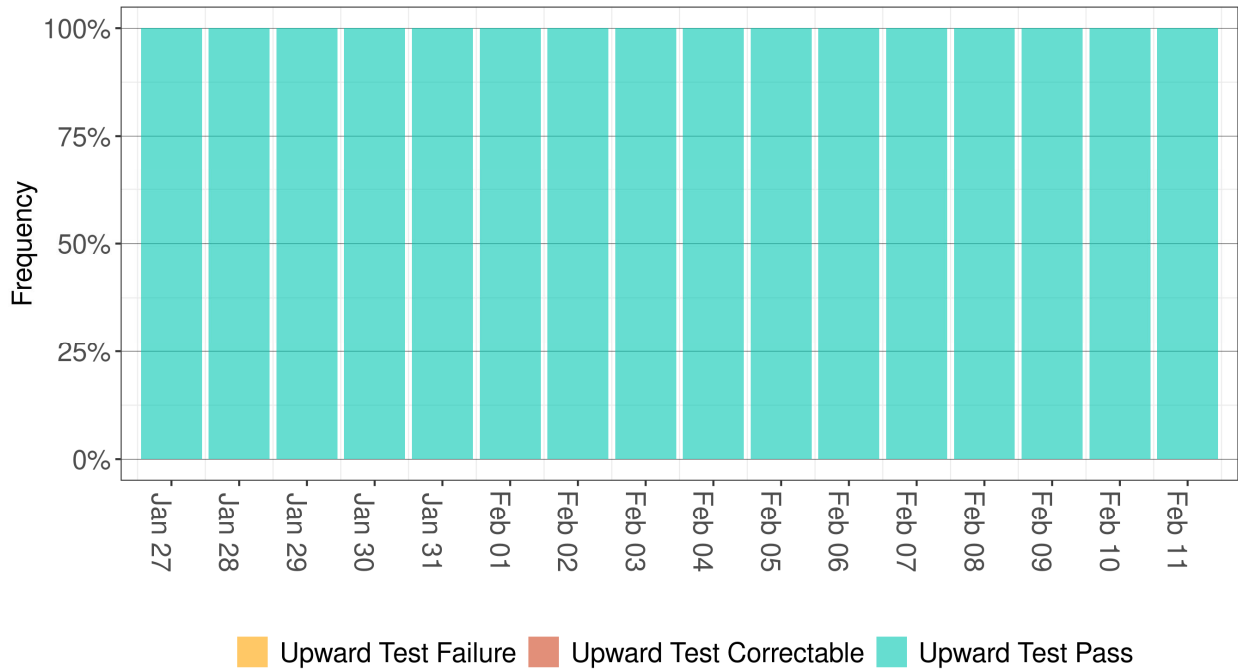
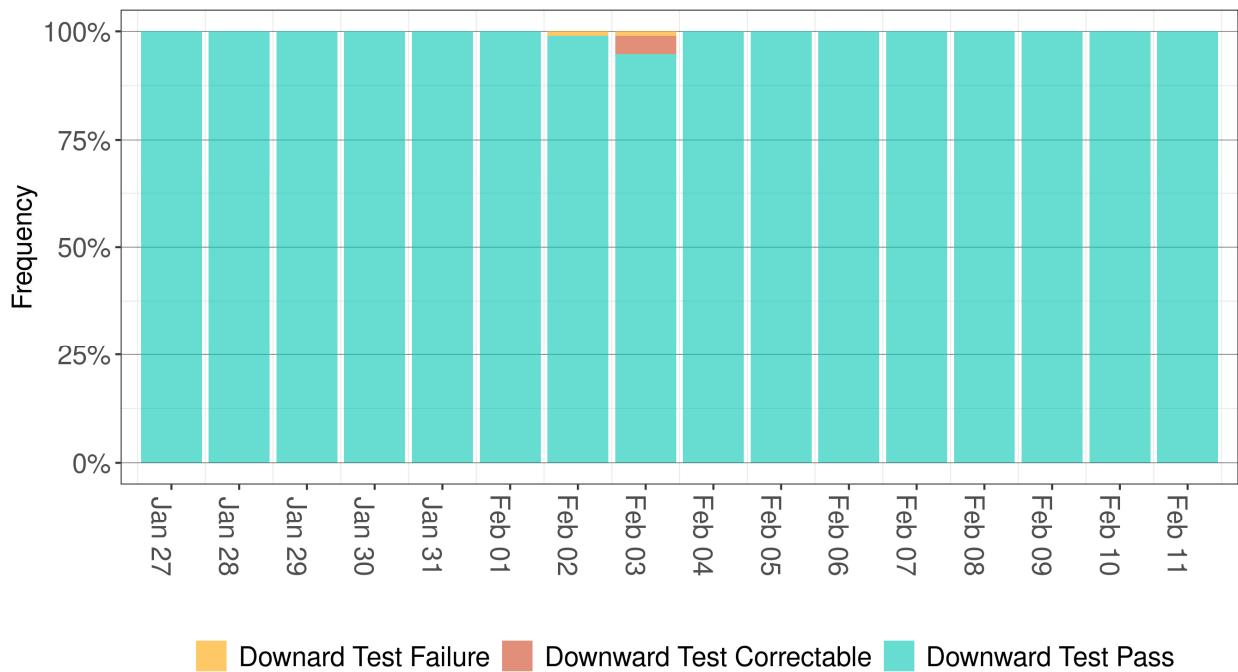


Figure 3: Daily frequency of bid range down capacity test results



A third test carried out before running the real-time market is the flexible ramp sufficiency test, as required by section 29.34 (m) of the ISO tariff. The flexibility test evaluates whether the EIM entity has sufficient flexible ramp capacity to meet its both upward and downward ramp requirements based on optimized resource schedules before the trading hour. Figure 4 and Figure 5 shows the daily frequency of flex ramp up and down test failures observed in the first sixteen days of parallel operation for the TID BAA. From January 27 through February 11, TID passed the flexible ramp up tests in 100 percent of the hours and passed the flex ramp down test 96 percent of the hours. There were two system issues that affected the TID’s flexible ramp sufficiency test results, which are represented as correctable events in Figure 4 and Figure 5. First, on February 3, TID failed the bid-range capacity test due to an ISO parallel operations system issue that was described in the prior section. When an EIM BAA fails the bid-range capacity test, it automatically fails the flexible ramp sufficiency test. Since the ISO system issue drove the bid-range capacity test failure, the flexible ramp sufficiency failure is also classified as a correctable event. Second, on February 9, 2021, a fifteen-minute market failed to generate a feasible solution and the operators used the advisory solution from the prior fifteen-minute market. In such events, it is expected that all EIM BAA resources would receive an advisory interval solution, and the subsequent fifteen-minute markets would use the advisory interval solution as the initial starting point for the next fifteen-minute market. However, due to a software issue for all multistage generating (MSG) resources, their initial condition was set to offline. This resulted in zero ramp capacity calculated from these resources and drove the flexible ramp sufficiency test failures. These flexible ramp sufficiency test failures are also listed as correctable events. The entire flexible ramp down test failures for the TID BAA shown in figure 5 was due to a lack of downward ramping capacity to meet the flexible ramping down requirement.

Figure 4: Daily frequency of flexible ramp up test results

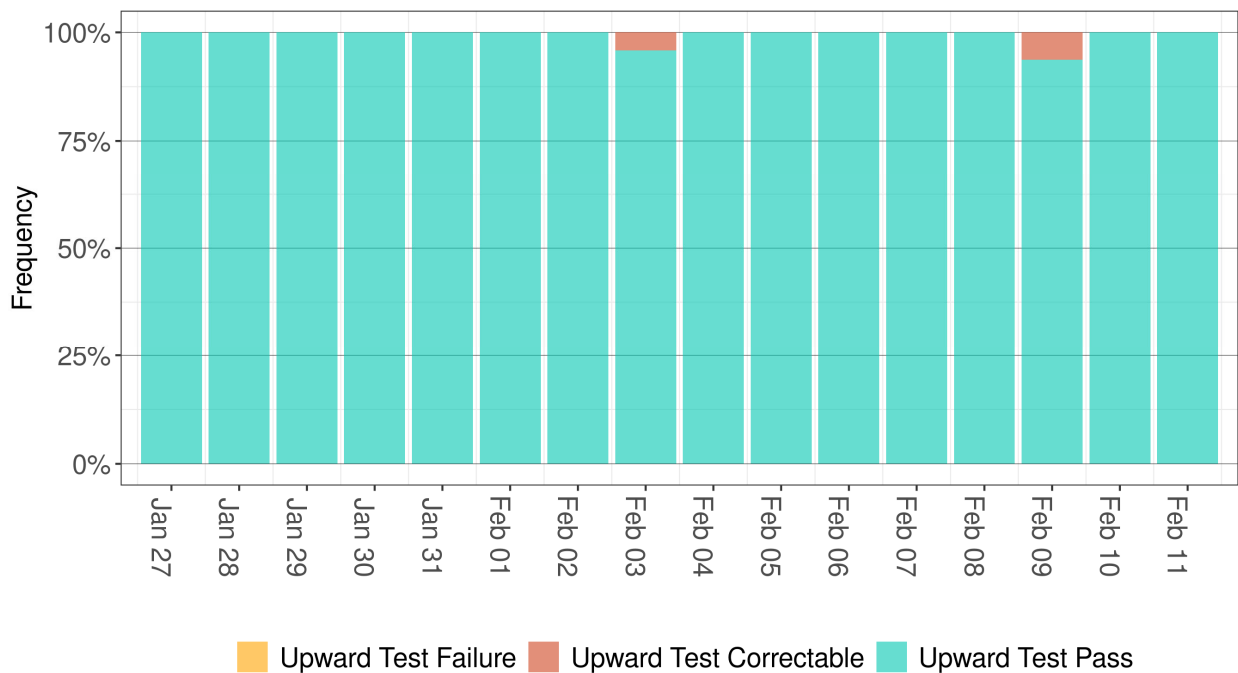


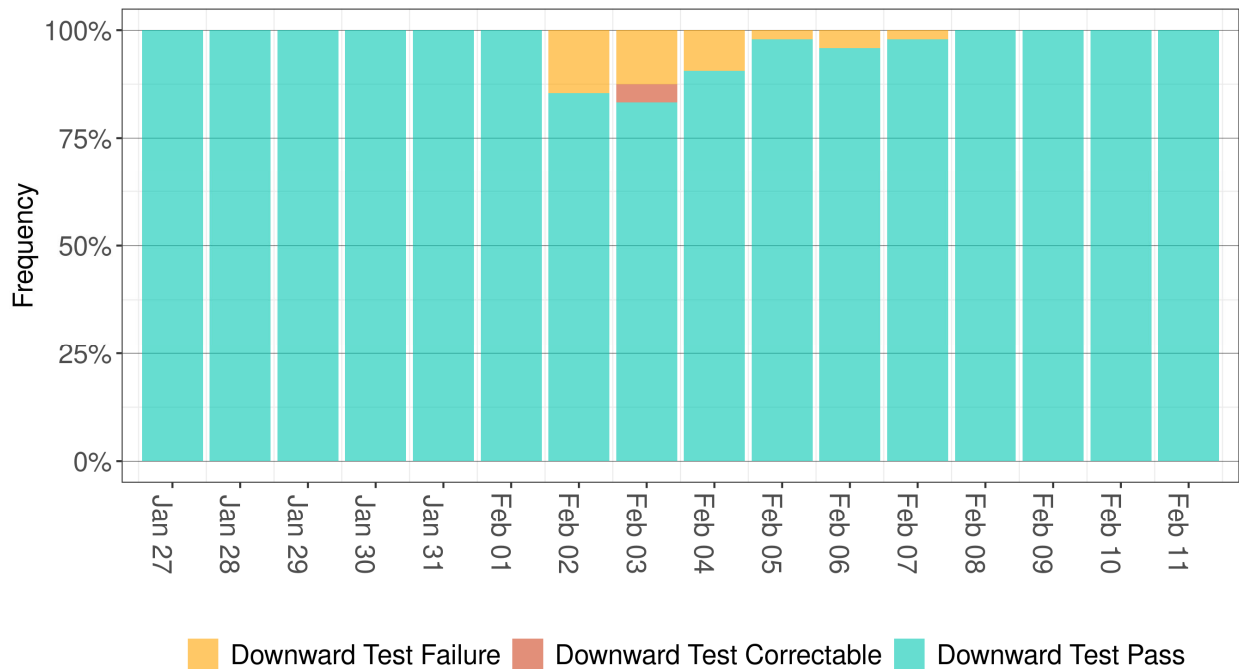
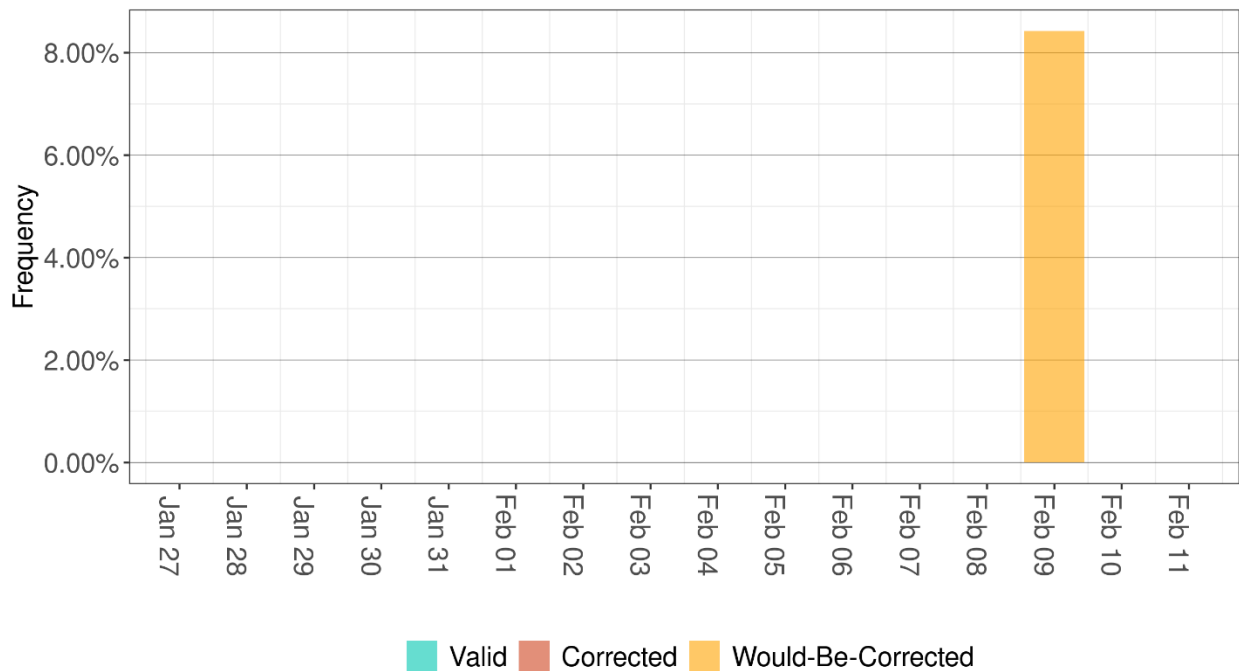
Figure 5: Daily frequency of flexible ramp down test results


Figure 6 and Figure 7 shows the frequency of the power balance constraint infeasibilities for under-generation conditions in both the FMM and RTD markets. The power balance constraint infeasibilities are pegged to the corresponding penalty prices, of \$1000/MWh for under-supply infeasibilities, and about -\$150/MWh for over-supply infeasibilities. However, during parallel operations, the EIM market for TID has been set-up to run under the conditions reflecting the price discovery mechanism that is in effect under the transitional period (the first six months in an actual production system). Under this functionality, when a power balance constraint is infeasible, the market will reflect the last economic signal instead of the penalty prices. The first six months transitional period pricing is based on the FERC Order¹, which grants the prospective EIM entity the time to re-adjust and fine-tune its systems, processes, and procedures to avoid conditions that trigger administrative penalty prices due to false under-supply or over-supply conditions. The transition period pricing also shields the prospective EIM entity from getting administrative penalty prices during the first six months. The transition period pricing allows the EIM Entity Operators to gain production experience for the timely response of informing the market about operators’ manual actions that are decided outside the market to maintain the EIM entity BAA reliability or balancing needs such as deployment of operating reserve in response to forced outages.

¹ *Calif. Ind. System Op.*, 153 FERC ¶ 61,104 (2015).

Figure 6: Daily frequency of supply infeasibilities in the fifteen-minute market


From January 27 through February 11 for the Fifteen Minute Market (FMM), TID had no valid under-supply power balance infeasibilities. On February 9, 2021, there were eight fifteen-minute intervals with under supply power balance infeasibilities that were driven by an ISO software issue affecting the initial condition of the multistage generating resources. This issue was described in the prior section and included in the Market Validation Items section. Since an ISO system issue drove the fifteen-minute under-supply infeasibility, this is represented as a correctable event in Figure 4.

For the five-minute market, TID had valid under-supply power balance infeasibilities in 0.2 percent of intervals. The five-minute market dispatches are based on the telemetry input. Since TID was not following telemetry information, as expected during parallel operations, and the market was using the actual resource output on January 27 this market set-up was the primary driver for these infeasibilities and Figure 5 classifies them as correctable events. The incorrect MSG initial condition due to ISO software issue on February 9 that resulted in flexible ramp sufficiency failure and fifteen-minute under-supply infeasibility drove the under-supply infeasibility in the five-minute market. Thus, Figure 5 classifies these infeasibilities as correctable events. All other five-minute under-supply infeasibilities were driven by resource set-up in the five-minute market.

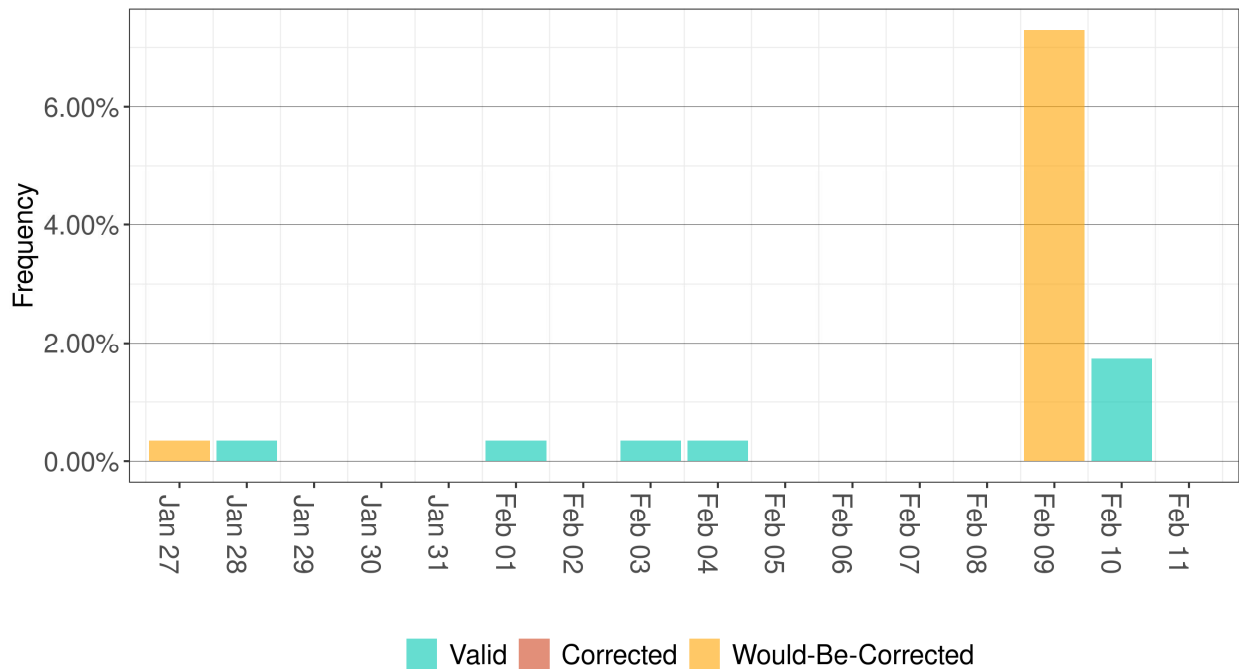
Figure 7: Daily frequency of supply infeasibilities in the five-minute market


Figure 8 shows the daily average ELAP LMPs for the fifteen-minute market and the five-minute market. The average daily prices from January 27 through February 11 in the fifteen-minute market were between \$6.53/MWh and \$37.51/MWh. The average five-minute prices were between \$22.63/MWh and \$45.15/MWh.

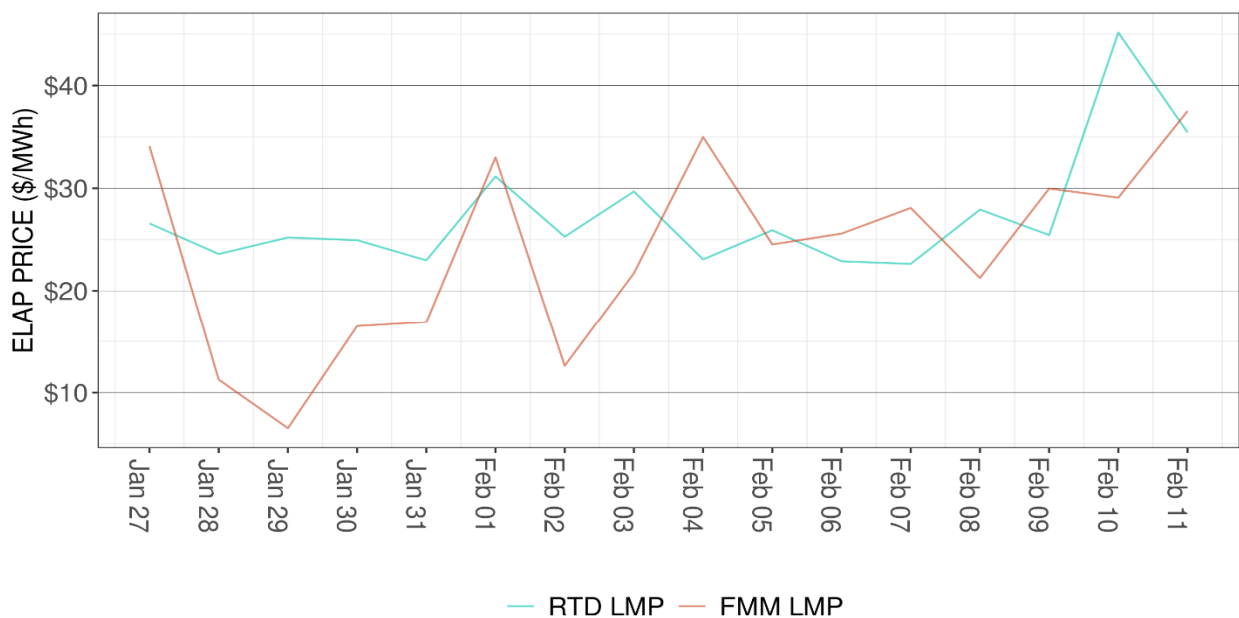
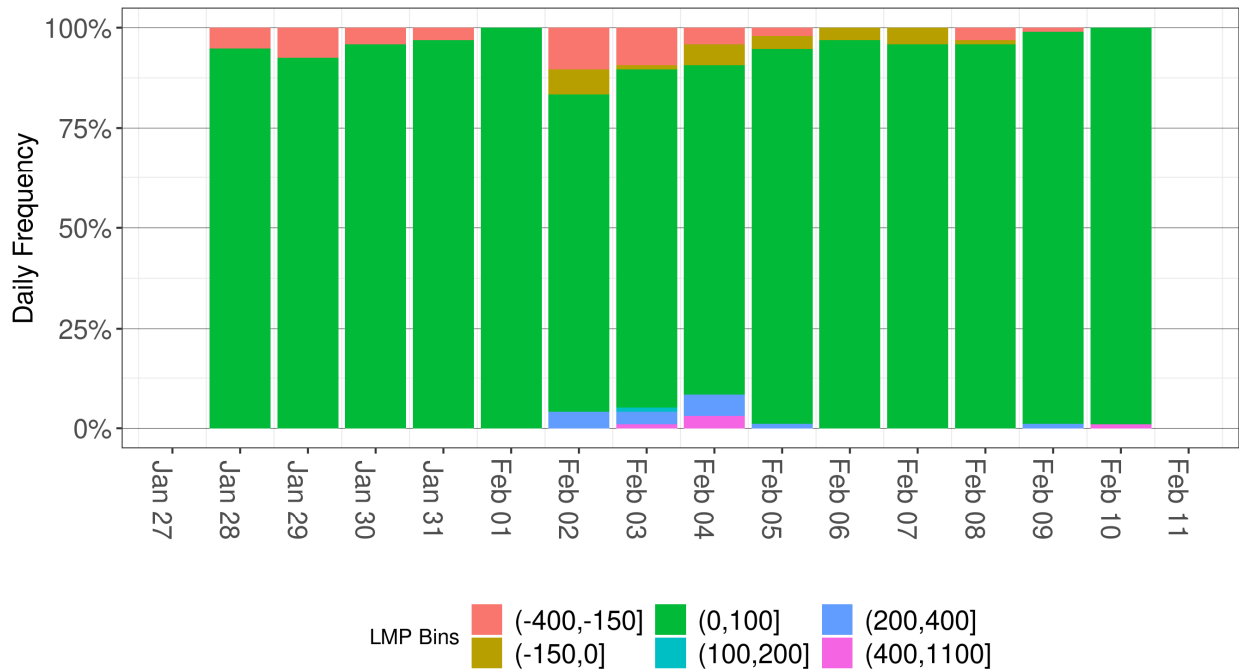
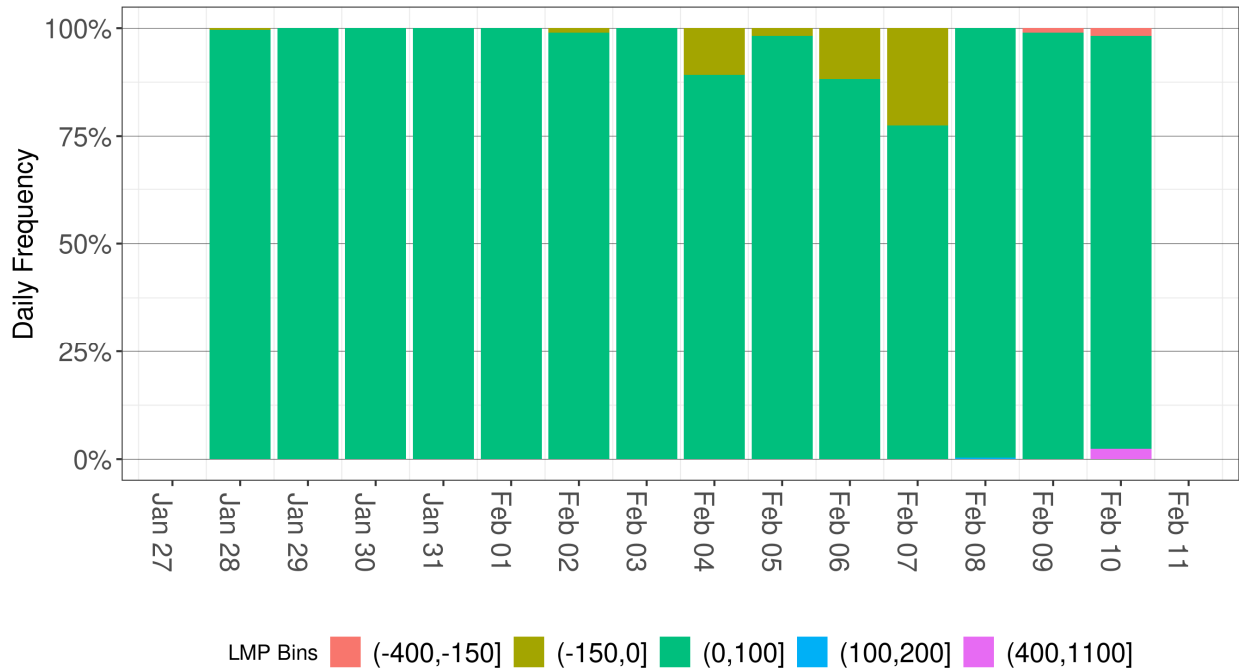
Figure 8: Daily average of fifteen-minute prices


Figure 9 and 10 show the fifteen-minute ELAP and five-minute ELAP prices for the TID BAA classified by price bins.

Figure 9: Daily frequency of fifteen-minute prices organized by price ranges



For all trade dates from February 1 through February 14, about 94 percent of the FMM intervals observed prices between \$0/MWh and 100/MWh, about 3 percent of intervals observed prices between -\$150/MWh and -\$400/MWh and remaining intervals observed prices in other price range. At the same time, 97 percent of the five-minute prices were between \$0/MWh and \$100/MWh and 3 percent of the five-minute prices were between \$0/MWh and -\$150/MWh.

Figure 10: Daily frequency of five-minute prices organized by price ranges


Market Validation Items

1. Parallel Operation bid transfer Issue

All EIM market participants use Scheduling Infrastructure and Business Rules (SIBR) application to submit bids to the ISO market. After the deadline to submit bids for each trading hour, an automated process transfers all the bids to various applications for downstream market processes. On February 3, 2021, hour ending 12, in the ISO parallel operations environment, this automated process failed to transfer bids for many BAAs including TID to other market applications. The Real-Time base schedule and resource sufficiency tests use BAA bids to perform bid-range capacity test and the flexible ramp sufficiency test. Because the bids were missing due to the system issue, all the balancing areas including TID failed the bid range capacity test and the flexible ramp sufficiency test.

2. Software Defects

During parallel operations, two software defects were identified that affected the market solutions.

a. MSG Initial Condition Issue

On February 9, 2021, a fifteen-minute market failed to generate a feasible solution, and the operators used the advisory solution from the prior fifteen-minute market. All EIM

BAA resources would receive an advisory interval solution in such events. The next fifteen-minute market must use the advisory solution as the initial starting to determine optimal dispatch. However, due to a software issue, the application set all multistage generating (MSG) resources initial condition offline, thereby shutting down all MSG resources. In the absence of the software issue, all MSG resources would have remained online.

b. Incorrect Flowgate Congestion:

The ISO fifteen-minute and five-minute markets perform security constraint economic dispatch for each balancing area in the EIM. The real-time market applications perform power flow analysis for the base case and perform contingency analysis for a pre-defined set of credible contingencies that are determined based on engineering studies. On several days during parallel operations, certain low voltage TID 69kv transmission lines were overloaded in the fifteen-minute and five-minute markets for two 500 kV line contingencies that are part of the ISO bulk operating system. TID generators were committed by the market application to reduce the flow on the transmission lines in these contingency cases. The ISO and TID engineers analyzed these power flow cases and determined that the overloads observed in the contingency cases are not reasonably based on the TID network topology. The issue was identified and is attributed to an area interchange control that was not configured correctly for the contingency evaluation cases. The save cases were re-run with the adjusted configuration for the contingency cases and the overloads are not present.

The ISO has reported these software issues to market application vendor and expects the vendor to deliver a fix within one week before TID joins the EIM market.

3. Don Pedro Station Modeling:

The TID balancing area has a particular set-up for units connected to its Don Pedro station. There are four generating units at the Don Pedro station, and when all units are online, three units are part of the TID BAA, and the fourth unit is part of the neighboring BAA. On the other hand, if any one of the generating unit is on an outage, the remaining units are re-configured to be shared between the TID and the neighboring BAA. This dynamic reconfiguration of units is a unique set-up requirement for TID, and the ISO is currently working with TID to determine a feasible solution that accurately represents generating units at all times.

Conclusion

The ISO validated both prices and schedules based on input data that was fed through the market systems parallel operations from January 27 through February 11. This validation demonstrates that the market solution produced is as expected and consistent with the market rules as designed, recognizing that the input data may be influenced by limitations inherent in the parallel operating environment and these limitations may affect the quality of the solution. When factors affecting the input data are fixed or controlled for, the quality of the market solutions are as expected and indicate that the systems and processes of TID are capable of operating in production.

CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service list in the captioned proceedings, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, CA this 23rd day of February, 2021.

/s/ Jacqueline Meredith

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